

Work Order ID 75642

75642

Page 1

October-27-11 11:42:13 AM

Item ID: D6005-128 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Crosstube Material
 Start Date: 27/10/2011 Start Qty: 20.00 ***20***
 Required Date: 30/07/2013 Req'd Qty: 20.00 ***20*** X
 Reference: Cust Item ID:
 Customer:

Approvals: Process Plan: M.L.J Date: 11/10/27 Tooling: _____ Date: _____
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____
 Run Start ***NR1***
 Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
Draw Nbr	Revision Nbr								
D6005	Rev A								

100 PURCHASING 0.00
100
 Purchasing Memo 0.00
 Purchasing Issue P/O: 15350
 a) Order as per Dwg D6005
 b) Material: 2.750 x 0.375 wall 7075-T6/T6511 (WW-T-700/7 or QQ-A-225/9 or QQ-A-200/11) seamless aluminum tube
 c) Minimum ultimate tensile strength = 77 ksi
 d) Minimum tensile yield strength = 66 ksi
 e) Tolerance are per ASTM B210 (see details on Dwg D6005)
 f) Material certification required

110 Receive & Inspect for Damage & Mat'l Certs 0.00
110
 Packaging Memo 0.00
 Packaging Ensure material certification is attached

CL 11/11/03 20
23x SP-30

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 75642

75642

Page 2

October-27-11 11:42:13 AM

Item ID: D6005-128 Accept ***N900040100*** Setup Start ***NS1***
 Revision ID: Stop ***NS2***
 Item Name: Crosstube Material
 Start Date: 27/10/2011 Start Qty: 20.00 ***20*** Cust Item ID:
 Required Date: 30/07/2013 Req'd Qty: 20.00 ***20*** Customer:
 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120 *120* QC Quality Control	QC6- Inspect dimensions to drawing Memo Ensure Material certification comply to Dwg D6005	0.00 0.00							
			DAS 16 9-8-13 13/06/10 See attached material is not slits						
150 *150* Packaging Packaging	Identify as per dwg & Stock Location: <u>L/G</u> Memo	0.00 0.00							
160 *160* QC Quality Control	QC21- Final Inspection - Work Order Release Memo	0.00 0.00							

m.m.c
 13/06/13
 13/06/13

1013-05-13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Picklist Print

October-27-11 11:42:17 AM

Page 1

Work Order ID: 75642

75642

Parent Item: D6005-128

D6005-128

Parent Item Name: Crosstube Material

Start Date: 27/10/2011

Required Date: 30/07/2013

Start Qty: 20.00

Required Qty: 20.00

Comments:

IPP Rev:C04.06.15Added tolerance to Step 2KJ/JLM

IPP Rev:D 08-09-23 fixe typo in dwg name DD verified by:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6005-128P		Purchased	No			110	Each	16.0000	1	20			
D6005-128P									**				
Crosstube material													
				<u>Location</u>				<u>Loc Qty</u>					
				MAT				16					
				71349				16					

23x SPB-S-30.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries



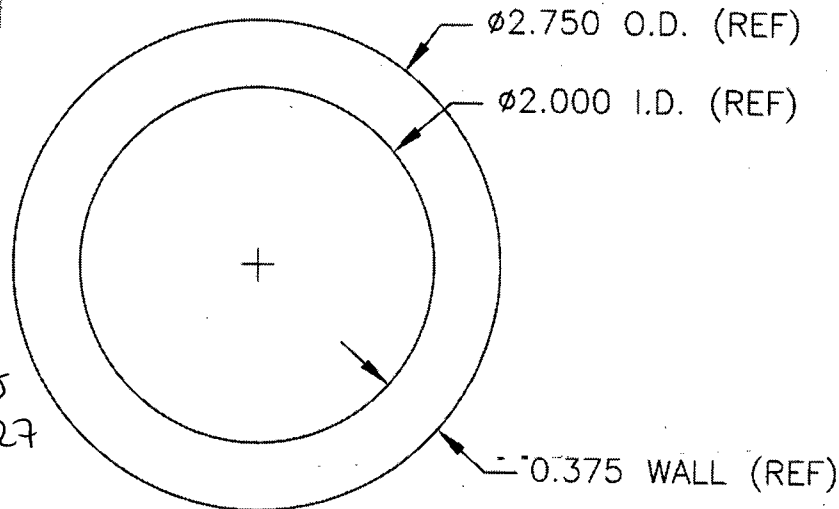
DESIGN <i>CP</i>	DRAWN BY <i>CP</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>[Signature]</i>	APPROVED <i>[Signature]</i>	DRAWING NO. D6005	REV. A SHEET 1 OF 1
DATE 00.11.17		TITLE CROSSTUBE MATERIAL	SCALE 1:1
A	00.11.17	NEW ISSUE	

SPECIFICATION CONTROL DRAWING

RELEASED
00.11.24 *[Signature]*

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT
WITHOUT NOTICE
WORK ORDER
NO. 75642

M.L.J
11/10/27



NOTES

- 1) D6005-XXX CROSSTUBE
LENGTH

WHERE XXX IS LENGTH IN INCHES
EG. 128" LONG TUBE: D6005-128

- 2) MATERIAL: 2.750 OD x 0.375 WALL 7075-T6/T6511 (WW-T-700/7 OR QQ-A-225/9 OR QQ-A-200/11) SEAMLESS ALUMINUM TUBE.
MINIMUM ULTIMATE TENSILE STRENGTH = 77 ksi
MINIMUM YIELD TENSILE STRENGTH = 66 ksi
- 3) TOLERANCES ARE PER ASTM B210 AS FOLLOWS:
O.D.: ± 0.006 MEAN (± 0.012 INCLUDING OVALITY)
WALL: ± 0.015 MEAN (± 0.038 INCLUDING ECCENTRICITY)
LENGTH: XXX $+0.125/-0.000$
STRAIGHTNESS: 0.010" DEVIATION / 12" LENGTH
- 4) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 5) CHEMICAL CONVERSION COAT PER DART QSI 005 4.1

Copyright © 2000 by DART AEROSPACE LTD

THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Aluminiumwerk Unna AG · Uelzener Weg 36 · D-59425 Unna

DART AEROSPACE LTD.
1270 Aberdeen Street
HAWKESBURY ON K6A 1K7

Kanada

Aluminiumwerk Unna AG

Uelzener Weg 36 · D-59425 Unna

Postfach 11 46 · D-59401

fon +49 (0) 23 03-206 - 0

fax +49 (0) 23 03-206- 116

petra.eisenblaetter@alunnatubes.com

www.alunnatubes.com

page: 1
date: 2.02.2012
customer: 40980

order confirmation 44993

your PO dated:	11.03.2011	contact:	Petra Eisenblätter
your PO No.:	PO 15350	Tel.:	+(303) 755 5672
your ref.:	Linda Lacelle	Fax:	+(303) 755 5936

representative: CLAUS J. BETTER

We supply acc. to our delivery terms and conditions:

item	quantity	unitprice	USD	unit value	USD	delivery
100	20,000	PC	336,00	PC	6.720,00	April 30, 2013

despatch date change

AWU article: 20783 / Tariff no. 76082081

Customer article: D6010-115 2.250 X 0.320 X 115 / Customer drawing no.

product: Tubes / seamless extruded / EN AW-7075 / round

condition: T 6511 / AMS-QQ-A-200/11

outer diameter:	2,250 INCH Tol.	+0,012	-0,012
tol.for mean OD		+0,006	-0,006
inner diameter:	1,610 INCH		
wall thickness:	0,320 INCH Tol.	+0,032	-0,032
fixed length	115,000 INCH Tol.	+0,125	

inspection cert.acc. to EN10204/3.1 / RM 531 / Rp0,2: 455 / RMS outer 25

tol. on quantity +10 % -10 %

2.250" OD 0.320"Wall, 115" lengths

Part Number D6010-115 crosstube

Surface Finish max. RMS 25

Tolerances per ASTM B210 / your drawing D6010

Commerzbank AG, Unna
Konto-Nr. 102 56 00 · BLZ 443 400 37
S.W.I.F.T. - Code: COBADE FF 443
IBAN : DE 90 4434 0037 01025600 00

Sitz der Gesellschaft: Unna
Amtsgericht Hamm. HRB 3045

Vorstand: Volker Findeisen

Vorsitzender des Aufsichtsrats: Thomas Wiese

– Allgemeine Lieferungs- und Zahlungsbedingungen –

[illegible]

order confirmation

44993

page: 2
date: 2.02.2012
customer: 40980

Tubes protected with corrosion protective oil
Tubes line marked

Packing: seaworthy wooden cases

item	quantity	unitprice	USD	unit value	USD	delivery
200	20,000	PC	996,00	PC	19.920,00	April 30, 2013

despatch date change

AWU article: 17956 / Tariff no. 76082081

Customer article: D6009-129 3.500 X 0.625 X 129 / Customer drawing no.

product: Tubes / seamless extruded / EN AW-7075 / round

condition: T 6511 / AMS-QQ-A-200/11

outer diameter:	3,500 INCH Tol.	+0,016	-0,016
tol.for mean OD		+0,008	-0,008
inner diameter:	2,250 INCH		
wall thickness:	0,625 INCH Tol.	+0,063	-0,063
fixed length	129,000 INCH Tol.	+0,188	

inspection cert.acc. to EN10204/3.1 / RM 531 / Rp0,2: 455

straightness 0,01 INCH / 1 FEET / RMS outer 25

tol. on quantity +10 % -10 %

3.500" OD 0.625" Wall, 129" lengths

Part Number D6009-129 crosstube

Surface Finish max. RMS 25

Tolerances per ASTM B210

Tubes protected with corrosion protective oil

Tubes line marked

Packing: seaworthy wooden cases

item	quantity	unitprice	USD	unit value	USD	delivery
300	20,000	PC	470,00	PC	9.400,00	April 30, 2013

despatch date change

AWU article: 17954 / Tariff no. 76082081

Customer article: D6005-128 2.750 X 0.375 X 128 / Customer drawing no.

product: Tubes / seamless extruded / EN AW-7075 / round

condition: T 6511 / AMS-QQ-A-200/11

outer diameter:	2,750 INCH Tol.	+0,012	-0,012
tol.for mean OD		+0,006	-0,006
inner diameter:	2,000 INCH		
wall thickness:	0,375 INCH Tol.	+0,038	-0,038
fixed length	128,000 INCH Tol.	+0,125	

test report acc. to EN 10204/3.1 / RM 531 / Rp0,2: 455

straightness 0,01 INCH / 1 FEET / RMS outer 25

On the other hand, the fact that the β values are not significantly different from zero indicates that the model is not misspecified. The fact that the β values are not significantly different from zero indicates that the model is not misspecified. The fact that the β values are not significantly different from zero indicates that the model is not misspecified.

order confirmation**44993**

page: 3
date: 2.02.2012
customer 40980

tol. on quantity +10 % -10 %
2.750" OD 0.375" Wall, 128" lengths
Part Number D6005-128 crosstube
Surface Finish max. RMS 25
Tolerances per ASTM B210 / your drawing D6005
Tubes protected with corrosion protective oil
Tubes line marked

Packing: seaworthy wooden cases
terms of delivery: DDP (Delivered, Duty, Paid)

Terms of payment: 30 days after date of delivery

delivery address:
Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ONT, K6A1K7
Canada

inglist ALUnna AG

ref. no.	44993/300
er PO.	PO. 15350
	04.29.13

Boxmarking:

Dart Aerospace PO. 15350 D 6005-128
 Made in Germany
 Dest. Hawkesbury Ont. Canada

by declare that the wooden packing material are totally free from bark and apparently

on live plant pests

m live plant pests										Boxdimension			Cast. / Heat No. Top		Pcs.	Cast. / Heat No. Middle		Pcs.	Cast. / Heat No. Bottom		Pcs.
no.	Box no.	OD (inch)	ID (inch)	Wall (inch)	Net Weight (lbs)	Tare lbs	Gross Weight	Pieces	lengths (ft)	Lengths (inch)	Width (inch)	height (inch)									
	1	2,750	2,000	0,375	847	218	1065	23	11	151,575	22,441	22,441				8934/1401545	23				

Abnahmeprüfzeugnis 3.1 - DIN EN 10204:2005

Inspection Certificate 3.1 - DIN EN 10204:2005 / Certificat de Reception 3.1 - DIN EN 10204:2005

Kunde:

Dart Aerospace Ltd.

Client:

1270 Aberdeen Street
K6A1K7 Hawkesbury, ON Canada

Produkt:

Product / Produit:

Rohre nahtlos gepresst
Tubes seamless extruded

Spezifikation:

Specification:

AMS - QQ - A - 200/11; Spezifikation Dart Aerospace D6005

Werkstoff:

Alloy/Alliage:

7075

Zeugnisnummer:

Cert No.: / No. du certificat:

301/13

Bestellnummer:

Order No. / No. de commande

PO 15350

Auftrag:

Our Reference/Notre Reference:

44993/300

Zustand:

Temper/État:

T 6511

Abmessung

Size / Dimension

2,750 INCH x 2,000 INCH x 0,375 INCH x 128,000 INCH
D6005-128 2.750 x 0.375 x 128

Kennzeichnung

Marking/Marquage:

ALUnna - Cert No. 301/13 - 7075-T6511 - Cast No. 8934 - AMS - QQA 200/11 - 2.750" OD X 0.375" Wall - Heat Lot No. 1401545 -
ALUnna Order Conf. No. 44993/300-1- PO. 15350

Lieferung

Delivered Material / Matériel délivré:

pcs.

lbs

23

847

Country of Manufacture: Germany

Products are in accordance with applicable RoHS

1. Chemische Analyse**Chemical Analysis / analyse chimique**

Other elements
each max. 0,05 %, total 0,15 %

	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Zr	Bi	Sn	Ni
Charge/ min.			1,2		2,1	0,18	5,1						
Cast No. max.	0,40	0,50	2,0	0,30	2,9	0,28	6,1	0,20					
8934/13	0,110	0,196	1,417	0,077	2,449	0,200	5,565	0,033	0,003	0,0129	0,0001	0,0018	0,0001

Hydrogen content: 0,08

ccm/100 g Al Elements without indication < 0,01 %

country of melt manufacturer: Germany

2. Mechanische Eigenschaften**Mechanical Properties / Valeurs Mécaniques**

Anforderungen Requirements	tensile (Rm) ksi	yield (Rp0,2) ksi	elongation 2" %	elongation A %	Hardness HB	Heat Lot No.
min. max.	77,0	66,0				
1	85,985	79,025	9,8	11,7		1401545

RMS outside 25 - max. 14,5 µ"

**Ergebnis der
Prüfungen:**

Es wird bestätigt, daß die Lieferung geprüft wurde und den Vereinbarungen bei der Bestellannahme entspricht

Test results:

We confirm that the delivery has been tested and applies to the agreements made on receipt of the order

Resultats:

Nous confirmons que la livraison a été contrôlée et correspond avec les conventions faites à la réception de la commande

GschwindU

06.03.2013



Certified acc. DIN EN ISO 9001:2008 and DIN EN 9100:2003
valid until 2013-11-10

Cert.- Reg. No.: 001959 QM08; 001959 ASH

Aluminiumwerk Unna AG, Uelzener Weg 36, 59425 Unna, Germany



ALUnna

Abnahmebeauftragter



Dart Aerospace Ltd.
1270 Aberdeen Street
Hawkesbury, ON K6A 1K7
Tel: 613 632 9577
Fax: 613 632 1053

PURCHASE ORDER

Purchase Order ID PO15350

Purchase Order Date 11/03/11

PO Print Date 12/07/11

Page Number 2 of 2

Order From :

ALUMINIUMWERK UNNA AG
630 3033 SOUTH PARKER RD
AURORA, CO 80014
USA

VU-ALU001

Contact Name

Vendor Phone

303 755 5672

Vendor Fax

303 755 5936

Vendor Account Nbr

Buyer

Chantal Lavoie

Requisition Nbr

Tax Resale Nbr

10127-2607

Terms

Net 30

Currency

USD

FOB

Destination-Collect

Special Inst:

AS PER DWG D6009 REV. A
B75641
MATERIAL: 7075-T6/T6511 AS PER WW-
T-700/7 OR
QQ-A-200/11 OR QQ-A-225/9 SEAMLESS
TUBE
MINIMUM ULTIMATE TENSILE
STRENGTH = 77 KSI
MINIMUM TENSILE YIELD STRENGTH
= 66 KSI
SIZE: 3.500" OD X 0.625" WALL X 129"
LONG

3

D6005-128P

Crosstube material

4/30/13

20.00

\$470.0000

\$9,400.00

Yes

Each

Special Inst:

AS PER DWG D6005 REV. A
B75642
MATERIAL: 7075-T6/T6511 AS PER WW-
T-700/7 OR
QQ-A-200/11 OR QQ-A-225/9 SEAMLESS
TUBE
MINIMUM ULTIMATE TENSILE
STRENGTH = 77 KSI
MINIMUM TENSILE YIELD STRENGTH
= 66 KSI
SIZE: 2.750" OD X 0.375" WALL X 128"
LONG

PO Total:

\$36,040.00

No substitution or deviation without
consent.
Certificate of Conformity or Material
Certification required when applicable

Change Nbr: 2

Change Date: 12/07/11

EXTRUSION INSPECTION SHEET

		SIDE A		SIDE B		ULTRA SONIC MEASURMENTS						
TUBE #	TOTAL LENGTH	DIA two readings	DIA two readings	INSIDE DIA	wall thickness measured w/vern	Strightness at 12" in middle	Rockwell Reading	LOCATION on tube	R1	R2	R3	R4
DWG	128.00"	2.750"		2.000"	.375"	0.010"	N/A	Middle	N/A			
1	128.00"	2.756"/2.750"	2.756"/2.754"	1.983"	0.381"/0.378"	0.003"	N/A	Middle	0.381"	0.379"	0.386"	0.389"
2	128.00"	2.753"/2.749"	2.751"/2.747"	1.982"	0.382"/0.379"	0.0025"	N/A	Middle	0.387"	0.394"	0.377"	0.373"
3	128.00"	2.748"/2.744"	2.746"/2.744"	1.983"	0.384"/0.367"	0.002"	N/A	Middle	0.384"	0.372"	0.381"	0.397"
4	128.00"	2.756"/2.753"	2.751"/2.749"	1.984"	0.390"/0.375"	0.0015"	N/A	Middle	0.382"	0.381"	0.386"	0.386"
5	128.00"	2.747"/2.745"	2.753"/2.749"	1.982"	0.385"/0.371"	0.003"	N/A	Middle	0.390"	0.376"	0.379"	0.388"
6	128.00"	2.751"/2.749"	2.749"/2.743"	1.984"	0.394"/0.370"	0.0015"	N/A	Middle	0.380"	0.389"	0.387"	0.374"
7	128.00"	2.751"/2.747"	2.752"/2.750"	1.985"	0.398"/0.374"	0.0015"	N/A	Middle	0.375"	0.382"	0.396"	0.388"
8	128.00"	2.750"/2.746"	2.754"/2.752"	1.982"	0.390"/0.373"	0.002"	N/A	Middle	0.389"	0.382"	0.384"	0.385"
9	128.00"	2.754"/2.749"	2.755"/2.752"	1.984"	0.386"/0.373"	0.003"	N/A	Middle	0.379"	0.385"	0.389"	0.384"
10	128.00"	2.750"/2.753"	2.754"/2.750"	1.984"	0.380"/0.376"	0.002"	N/A	Middle	0.386"	0.383"	0.388"	0.386"
11							N/A	Middle				
12							N/A	Middle				
13							N/A	Middle				
14							N/A	Middle				
15							N/A	Middle				
PART # D6005-128"		P/O# 15350			BATCH # B75642			Notes:				

end measurement with vern

Mean OUTSIDE DIA. Permissible +- 0.015									
Tube	Actual A	Actual B	Mean	Nominal	Tolerance	min	max	min	max
1	0.381	0.378	0.380	0.375	0.015	0.360	0.390	0.0195	-0.011
2	0.382	0.379	0.381	0.375	0.015	0.360	0.390	0.0205	-0.010
3	0.384	0.367	0.376	0.375	0.015	0.360	0.390	0.0155	-0.015
4	0.390	0.375	0.383	0.375	0.015	0.360	0.390	0.0225	-0.008
5	0.385	0.371	0.378	0.375	0.015	0.360	0.390	0.018	-0.012
6	0.394	0.370	0.382	0.375	0.015	0.360	0.390	0.022	-0.008
7	0.398	0.374	0.386	0.375	0.015	0.360	0.390	0.026	-0.004
8	0.390	0.373	0.382	0.375	0.015	0.360	0.390	0.0215	-0.009
9	0.386	0.373	0.380	0.375	0.015	0.360	0.390	0.0195	-0.011
10	0.380	0.376	0.378	0.375	0.015	0.360	0.390	0.018	-0.012
11			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
12			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
13			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
14			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
15			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!

OUTSIDE DIA. Permissible +- 0.038								
Tube	Actual A	Actual B	Nominal	Tolerance	min	max	min	max
1	0.381	0.378	0.375	0.038	0.337	0.413	0.044	-0.035
2	0.382	0.379	0.375	0.038	0.337	0.413	0.045	-0.034
3	0.384	0.367	0.375	0.038	0.337	0.413	0.047	-0.046
4	0.390	0.375	0.375	0.038	0.337	0.413	0.053	-0.038
5	0.385	0.371	0.375	0.038	0.337	0.413	0.048	-0.042
6	0.394	0.370	0.375	0.038	0.337	0.413	0.057	-0.043
7	0.398	0.374	0.375	0.038	0.337	0.413	0.061	-0.039
8	0.390	0.373	0.375	0.038	0.337	0.413	0.053	-0.040
9	0.386	0.373	0.375	0.038	0.337	0.413	0.049	-0.040
10	0.380	0.376	0.375	0.038	0.337	0.413	0.043	-0.037
11				0.038	-0.038	0.038	0.038	-0.038
12				0.038	-0.038	0.038	0.038	-0.038
13				0.038	-0.038	0.038	0.038	-0.038
14				0.038	-0.038	0.038	0.038	-0.038
15				0.038	-0.038	0.038	0.038	-0.038

center measurment with ultra sonic

Mean OUTSIDE DIA. Permissible +- 0.015									
Tube	highest	lowest	Mean	Nominal	Tolerance	min	max	min	max
1	0.389	0.379	0.384	0.375	0.015	0.360	0.390	0.024	-0.006
2	0.394	0.373	0.384	0.375	0.015	0.360	0.390	0.0235	-0.007
3	0.397	0.372	0.385	0.375	0.015	0.360	0.390	0.0245	-0.006
4	0.386	0.381	0.384	0.375	0.015	0.360	0.390	0.0235	-0.007
5	0.390	0.376	0.383	0.375	0.015	0.360	0.390	0.023	-0.007
6	0.389	0.374	0.382	0.375	0.015	0.360	0.390	0.0215	-0.009
7	0.396	0.375	0.386	0.375	0.015	0.360	0.390	0.0255	-0.005
8	0.389	0.382	0.386	0.375	0.015	0.360	0.390	0.0255	-0.005
9	0.389	0.379	0.384	0.375	0.015	0.360	0.390	0.024	-0.006
10	0.388	0.383	0.386	0.375	0.015	0.360	0.390	0.0255	-0.005
11			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
12			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
13			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
14			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!
15			#DIV/0!		0.015	-0.015	0.015	#DIV/0!	#DIV/0!

OUTSIDE DIA. Permissible +- 0.038								
Tube	highest	lowest	Nominal	Tolerance	min	max	min	max
1	0.389	0.379	0.375	0.038	0.337	0.413	0.052	-0.034
2	0.394	0.373	0.375	0.038	0.337	0.413	0.057	-0.040
3	0.397	0.372	0.375	0.038	0.337	0.413	0.060	-0.041
4	0.386	0.381	0.375	0.038	0.337	0.413	0.049	-0.032
5	0.390	0.376	0.375	0.038	0.337	0.413	0.053	-0.037
6	0.389	0.374	0.375	0.038	0.337	0.413	0.052	-0.039
7	0.396	0.375	0.375	0.038	0.337	0.413	0.059	-0.038
8	0.389	0.382	0.375	0.038	0.337	0.413	0.052	-0.031
9	0.389	0.379	0.375	0.038	0.337	0.413	0.052	-0.034
10	0.388	0.383	0.375	0.038	0.337	0.413	0.051	-0.030
11				0.038	-0.038	0.038	0.038	-0.038
12				0.038	-0.038	0.038	0.038	-0.038
13				0.038	-0.038	0.038	0.038	-0.038
14				0.038	-0.038	0.038	0.038	-0.038
15				0.038	-0.038	0.038	0.038	-0.038

MEAN OUTSIDE DIAMETER PERMISSIBLE +- 0.006 side A

Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.756	2.750	2.753	2.750	0.006	2.744	2.756	0.009	-0.003
2	2.753	2.749	2.751	2.750	0.006	2.744	2.756	0.007	-0.005
3	2.748	2.744	2.746	2.750	0.006	2.744	2.756	0.002	-0.010
4	2.756	2.753	2.755	2.750	0.006	2.744	2.756	0.011	-0.001
5	2.747	2.745	2.746	2.750	0.006	2.744	2.756	0.002	-0.010
6	2.751	2.749	2.750	2.750	0.006	2.744	2.756	0.006	-0.006
7	2.751	2.747	2.749	2.750	0.006	2.744	2.756	0.005	-0.007
8	2.750	2.746	2.748	2.750	0.006	2.744	2.756	0.004	-0.008
9	2.754	2.749	2.752	2.750	0.006	2.744	2.756	0.007	-0.004
10	2.750	2.753	2.752	2.750	0.006	2.744	2.756	0.007	-0.004
11			#DIV/0!		0.006	-0.006	0.006	#DIV/0!	#DIV/0!
12			#DIV/0!		0.006	-0.006	0.006	#DIV/0!	#DIV/0!
13									
14									
15									
16									

MEAN OUTSIDE DIAMETER PERMISSIBLE +- 0.006 Side B

Tube #	Actual A	Actual B	Mean	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.756	2.754	2.755	2.750	0.006	2.744	2.756	0.011	-0.001
2	2.751	2.747	2.749	2.750	0.006	2.744	2.756	0.005	-0.007
3	2.746	2.744	2.745	2.750	0.006	2.744	2.756	0.001	-0.011
4	2.751	2.749	2.750	2.750	0.006	2.744	2.756	0.006	-0.006
5	2.753	2.749	2.751	2.750	0.006	2.744	2.756	0.007	-0.005
6	2.749	2.743	2.746	2.750	0.006	2.744	2.756	0.002	-0.010
7	2.752	2.750	2.751	2.750	0.006	2.744	2.756	0.007	-0.005
8	2.754	2.752	2.753	2.750	0.006	2.744	2.756	0.009	-0.003
9	2.755	2.752	2.754	2.750	0.006	2.744	2.756	0.009	-0.002
10	2.754	2.750	2.752	2.750	0.006	2.744	2.756	0.008	-0.004
11			#DIV/0!		0.006	-0.006	0.006	#DIV/0!	#DIV/0!
12			#DIV/0!		0.006	-0.006	0.006	#DIV/0!	#DIV/0!
13									
14									
15									
16									

OUTSIDE DIA. Permissible (with Ovality) +- 0.012 side A

Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.756	2.750	0.012	2.738	2.762	0.018	-0.006
2	2.753	2.750	0.012	2.738	2.762	0.015	-0.009
3	2.748	2.750	0.012	2.738	2.762	0.010	-0.014
4	2.756	2.750	0.012	2.738	2.762	0.018	-0.006
5	2.747	2.750	0.012	2.738	2.762	0.009	-0.015
6	2.751	2.750	0.012	2.738	2.762	0.013	-0.011
7	2.751	2.750	0.012	2.738	2.762	0.013	-0.011
8	2.750	2.750	0.012	2.738	2.762	0.012	-0.012
9	2.754	2.750	0.012	2.738	2.762	0.016	-0.008
10	2.750	2.750	0.012	2.738	2.762	0.012	-0.012
11			0.012	-0.012	0.012	0.012	-0.012
12			0.012	-0.012	0.012	0.012	-0.012
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) +- 0.012 side b

Tube #	Actual A	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.756	2.750	0.012	2.738	2.762	0.018	-0.006
2	2.751	2.750	0.012	2.738	2.762	0.013	-0.011
3	2.746	2.750	0.012	2.738	2.762	0.008	-0.016
4	2.751	2.750	0.012	2.738	2.762	0.013	-0.011
5	2.753	2.750	0.012	2.738	2.762	0.015	-0.009
6	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
7	2.752	2.750	0.012	2.738	2.762	0.014	-0.010
8	2.754	2.750	0.012	2.738	2.762	0.016	-0.008
9	2.755	2.750	0.012	2.738	2.762	0.017	-0.007
10	2.754	2.750	0.012	2.738	2.762	0.016	-0.008
11			0.012	-0.012	0.012	0.012	-0.012
12			0.012	-0.012	0.012	0.012	-0.012
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) +- 0.012 side A

Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.750	2.750	0.012	2.738	2.762	0.012	-0.012
2	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
3	2.744	2.750	0.012	2.738	2.762	0.006	-0.018
4	2.753	2.750	0.012	2.738	2.762	0.015	-0.009
5	2.745	2.750	0.012	2.738	2.762	0.007	-0.017
6	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
7	2.747	2.750	0.012	2.738	2.762	0.009	-0.015
8	2.746	2.750	0.012	2.738	2.762	0.008	-0.016
9	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
10	2.753	2.750	0.012	2.738	2.762	0.015	-0.009
11			0.012	-0.012	0.012	0.012	-0.012
12			0.012	-0.012	0.012	0.012	-0.012
13							
14							
15							
16							

OUTSIDE DIA. Permissible (with Ovality) +- 0.012 side b

Tube #	Actual B	Nominal	Tolerance	min allowable dimension	max allowable dimension	Results for min allowable	Results for max allowable
1	2.754	2.750	0.012	2.738	2.762	0.016	-0.008
2	2.747	2.750	0.012	2.738	2.762	0.009	-0.015
3	2.744	2.750	0.012	2.738	2.762	0.006	-0.018
4	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
5	2.749	2.750	0.012	2.738	2.762	0.011	-0.013
6	2.743	2.750	0.012	2.738	2.762	0.005	-0.019
7	2.750	2.750	0.012	2.738	2.762	0.012	-0.012
8	2.752	2.750	0.012	2.738	2.762	0.014	-0.010
9	2.752	2.750	0.012	2.738	2.762	0.014	-0.010
10	2.750	2.750	0.012	2.738	2.762	0.012	-0.012
11			0.012	-0.012	0.012	0.012	-0.012
12			0.012	-0.012	0.012	0.012	-0.012
13							
14							
15							
16							

